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Investments in Container Terminals: Public Private Partnerships in Europe

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The desire to create a more competitive, market based transport system has led to the involvement of the private sector in infrastructure investments. However, there are still distinct aspects that often make investment in transport infrastructure unattractive to private parties. This paper elucidates the characteristics of investments in infrastructure in general, with the aim to clarify the hesitation of private investors. One specific category of infrastructure investments, viz. container terminals, is discussed here as an interesting case. European container terminals are mostly financed with a strong involvement of private parties. From a comparative study between investments in container terminals and other investments in infrastructure, we argue that the terminal market has several features (such as imperfect competition), which lead to a lower risk for private parties. Because of these characteristics, public-private partnerships occur rather often and seem to be attractive. A situation of a fully competitive terminal market without government intervention is in the long-run possible and clearly more realistic than in other infrastructure markets. It should be realised however, that a common European policy is required to avoid distortion of competition among ports due to different subsidy regimes.
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INTRODUCTION

Transportation lies at the heart of the spatial-economic evolution of our economies. A well-functioning transport network is an important condition for the competitive position of regions and cities. Today, the most prosperous locations are found where transport nodes coincide with skilled labour markets and a high quality environment. This has encouraged some countries to take a more pro-active approach towards transport planning, with investment preceding rather than following demand. Seen from this perspective, infrastructure plays a fundamental role in the development of regions, and investments in infrastructure are for many (local) governments a critical element of their policy. In a European context, investments in transport infrastructure are usually regarded as a major incentive for economic development, especially when one looks at the Trans European Network (TEN) plans.

In Europe, the traditional approach to transport infrastructure has been based on detailed government intervention, ostensibly to protect and promote the public interest. In the case of infrastructure, direct state provision has been the norm (including financing). However, in recent years profound changes in economic and spatial policy have brought about a re-orientation so that the dominant role of the public sector is increasingly questioned. Especially in port financing, experience and research strongly suggest that privatisation has been effective for enhancing efficiencies and lowering costs, provided there is a competitive environment (Kent and Ashar, 2001). The trend towards market principles and liberalist views sketched by Fukuyama (1992), and mirrored amongst others in devolution principles such as deregulation, decentralisation and privatisation, has far reaching implications for public sector involvement in physical planning including infrastructure planning. These policy changes have profound implications for financing European infrastructure (Henry, 1993). This trend is reinforced by developments such as public budget deficits in many countries and the need for more competition in the provision of (semi) public goods, in order to enhance efficiency.

These developments have often led to the desire to create a more competitive, market based transport sector in which the government does not need to finance all investments in infrastructure. So far, private financing of transport infrastructure has been most significant in Latin America and the Caribbean region and in East Asia (World Bank, 1996). The present paper pays particular attention to the problems and possibilities in private financing. After outlining some of the characteristics and risks of private investment in infrastructure, the focus will be on a particular kind of infrastructure; namely container terminals at (sea-)ports. Private involvement in financing and operating container terminals in ports is said to be high

compared with other investments in European transport infrastructure such as roads and railways (see eg Farrell, 1999). The aim of the present paper is to elucidate on this theme and to identify particular issues that demonstrate why terminals are likely to be attractive for private investors, based on a comparative study.

THE NATURE OF INVESTMENTS IN INFRASTRUCTURE

Infrastructure is a broad concept; several definitions and descriptions have been used in the literature. Recently, a study on the meaning and content of this term has been carried out by Nijkamp *et al.* (2000). According to this study, infrastructure includes those real estate provisions which increase efficiency in the use of factors of production and meet the following requirements: infrastructure is directly productive, is characterised by stock features (capital good) and it has the character of a (semi-) public good (in this respect non-excludability and non-rivalry in consumption are often cited as characteristics of a public good). According to the Nijkamp *et al.* study, three categories of infrastructure can be distinguished. Physical network infrastructure includes elements such as transport infrastructure and public utilities, water management and industrial sites. Immaterial knowledge infrastructure and environmental infrastructure are the two other categories.

Traditional welfare theory argues that social welfare can be maximised through market transactions based on free exchange in perfectly competitive markets. In this ideal economy, government intervention would negatively affect the Pareto-optimal outcome. However, following the above-mentioned description, the market for infrastructure is far from being considered as perfectly competitive. Market imperfections exist in the form of, for instance, externalities, which make governmental intervention necessary in this sector. The aim of the government is then to remedy this sub-optimal allocation and in this way to move towards the theoretically pure situation of perfect competition.

In recent years however, it has become understood that, mainly due to government failures, financing of all types of infrastructure by governments is not an appropriate solution, and certainly not in a situation of high public sector deficits. These failures of government agencies lead often to problematic cost estimates and in several cases to inefficient spending of public money. On the other hand, it is overly optimistic to think that these failures will completely disappear with private financing of infrastructure investments. However, from a financial point of view, private involvement is attractive, for attention is focused on economic and commercial value.

Options for private finance in transport

Private financing of construction is usually associated with continuing public sector responsibility for strategic network and locational planning. In the case of toll roads and urban mass transit infrastructure, private firms are normally given a concession to manage and operate the facility for a certain period, with ownership of the asset returning at some point in time to the public sector. There are several ways in which the private sector can contribute to the development of the transport system (ITS, 1999). For example, the private sector can be involved directly in financing new investment, as is the case in many rail projects, with the operator of the infrastructure repaying the loan. This introduces the issue of the impact of private sector objectives, emphasising the financial return on investment in the specific measures covered. Another possibility is that the private sector can be involved in the operation (and possibly also in the financing) of the infrastructure, deriving its revenue from the user. This leads to the imposition of user charges through fares and parking or road use charges. These are usually determined in order to maximise revenue, and this can significantly affect the outcome of the overall strategy.

The private sector usually seeks commercial profit either through return on investment, or as value captured through improvements in the transport system. Despite the higher costs of capital raised from commercial sources and the need to cover risks and achieve profitability, it has often been argued that the overall cost to society could be lower with private financing, than if the government were to provide the facilities through tax proceeds. The following objectives of private financing can be identified (ITS, 1999):

- Minimisation of the impact of additional taxation, debt burden or financial guarantees;
- Introduction of the benefits of private sector management and control techniques in the construction and operational phases of projects (possibly leading to lower costs);
- Promotion of private entrepreneurial initiative and innovation in infrastructure projects; and
- Increase in the financial resources that might be available for the projects.

In container terminal investments, especially the second and fourth objectives for involvement of private container terminal operators apply. Private finance can be said to be only purely private, if (ITS, 1999):

- The private party runs all risks;
- The investment is paid directly by its users; and
- The operation is based upon user charges.

In practice, transport infrastructure rarely fulfils these requirements. Almost all European transport infrastructure (except for the Channel tunnel and toll roads in France, Italy and Spain) has been financed and operated by governments or by public bodies linked to the government.

Characteristics of investments in infrastructure

Investments in infrastructure have some special features. Broadly speaking one can identify seven characteristics of investments in infrastructure (ECMT, 1990). Firstly, the expectation of the *economic life of infrastructure* is very long. This may range from 20 years to more than a century. The pay-back period of infrastructure investments is also long; usually around 15 to 30 years. The pay-back period for normal capital goods is generally much shorter, the average being eight to nine years.

Secondly, during the construction time, a *large amount of capital* is required. Often high loans have to be acquired, which makes interest costs relatively high. The costs are also influenced by the project financier; the government is usually able to attract loans which are cheaper (ie lower interest rates) than the private sector.

Another feature of infrastructure investments is that the *waiting period prior to actual infrastructure construction* can be very long. This has to do with the many legal decision-making procedures, resistance by society and interest groups, and other time consuming formalities. These formalities often lead to project changes that can have a major influence on project costs. During this planning process, different unforeseen events may thus happen which are of critical influence on the whole project and may even lead to planning disasters (see Hall, 1990).

A fourth characteristic is the *irreversibility of the investment* once the project has started. If construction is discontinued, this would lead to a significant capital loss, because it is not possible to use the investment in another way. From the investor's point of view, the irreversibility of investment is a fundamental obstacle which increases the threshold of the minimum rate of return required.

The next feature of infrastructure investment is the *long construction period*. This period may take two to seven years depending on the scale of the project. During this period there are no revenues, but there are of course already interest and other costs.

Another characteristic is the *uniqueness* of each infrastructure project. Each infrastructure project is different from another. This fact is likely to have an influence on cost estimates due to lack of experience, low learning possibilities and lack of comparability.

A final characteristic in many cases is the relatively *low level of operational (variable) costs*, especially on longer distance infrastructure. There are some overhead, maintenance and labour costs, but compared to the construction costs

of infrastructure or the exploitation costs of other investments, these costs are relatively low. In such cases (high fixed costs and low variable costs), setting prices according to marginal costs (which is economically optimal) does not allow a satisfactory return on investment and this, in general, makes infrastructure investments unattractive to the private investor.

Figure 1 exemplifies this case (for simplicity, average variable and marginal costs are considered constant, which is a plausible assumption as long as capacity is sufficient). At traffic level q, optimum price for the investor should be p_1 (this corresponds to the point where marginal revenue is equal to marginal cost). Total revenue is given by the area $0qAp_1$ and total cost by $0qBp_2$. A loss of p_1p_2BA is incurred at this level of traffic and, as a matter of fact, there is no price at which the project is profitable (average total cost curve always above demand line). It is now possible to operate the infrastructure project at a profit, only if external funds are available (government or other interested parties). Such funds would help lowering the investor's ATC curve below A, thus enabling him to realise a profit.

The above characteristics show that high financial capital outlays are required at the outset of a project and, apparently, the many risks involved are equally significant.

Risks in infrastructure investments

The major issue in involving private finance for transport infrastructure investments concerns the sharing of risk. As noted above, in such investments,

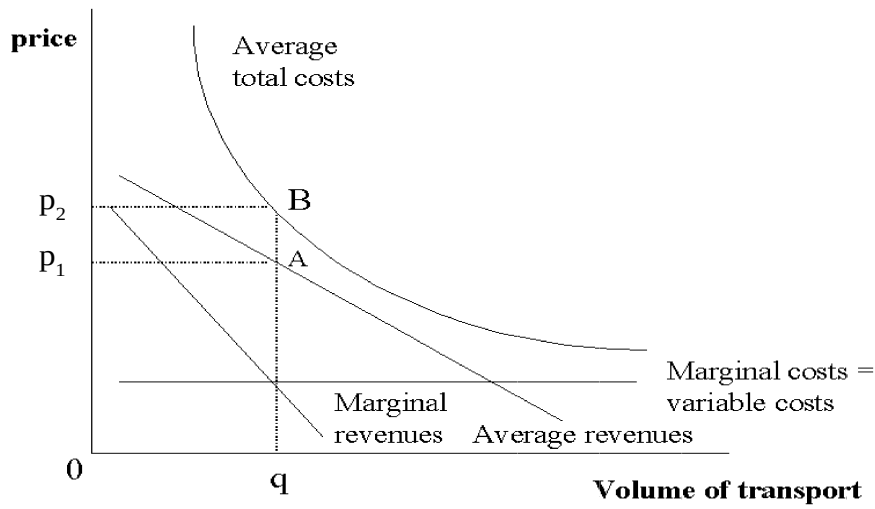

Figure 1: Market situation for an investor in infrastructure
Source: Nijkamp and Rienstra (1995)

the flow of revenues often begins many years after the initial investment; this increases uncertainty (and thus risk) compared to alternative investment options. Investments in infrastructure can entail a multitude of risks. The following categories can be distinguished (Nijkamp and Rienstra, 1995):

- political risks: for example, changes in transport policy or regulations by the government;
- financial risks: fluctuations in interest rates and exchange rates; wrong expectations about inflation;
- construction risks: delays; unexpected and unpredictable costs;
- operational risks: damage by accidents and vandalism; and
- commercial risks: wrong cost estimates or wrong estimates of traffic volume.

All these risks make it difficult to draw up a reliable cost and demand estimation; each risk has its own distinct influence on these variables. A policy shift, for instance, may lead to the construction of a road tunnel to protect a natural area, whereas at the outset of the project the road was planned to cross the area. This leads, of course, to higher costs that could have never been estimated at the start of the project. A clear example of a commercial risk is that of the Öresund bridge between Sweden and Denmark where traffic was highly overestimated leading to disappointing toll revenues.

In conclusion, the risks of infrastructure investments are comparatively high and, thus, private sector interest commensurately low. Clearly, the public sector has a role to play here by making investments more attractive. This could be done, for instance, by means of joint-risk arrangements (guaranteeing a public subsidy if the use of infrastructure is below expectations), or by guaranteeing a minimum profit ratio.

Interestingly, however, some types of infrastructure, such as telecommunications and seaports, seem to be more appealing to the private sector. Seaports are discussed in more detail in what follows.

CONTAINER TERMINAL INVESTMENT: EUROPEAN STATE OF THE ART

Port investment in general

Containerisation has led to the construction of increasingly larger vessels, while market structure in liner shipping has resulted in the formation of alliances of container carriers. These developments have forced port authorities and container terminal operators to increase their scale too. The location of an individual port is nowadays becoming less important compared to its ability to offer services and hinterland connections that fit into the alliance networks (see also van Klink,

1995). Networking – rather than location – seems the key to future growth of ports. Furthermore, volumes per alliance are enormous and this will probably result in more dedicated container terminals or, in the medium-term, maybe even in dedicated container networks.

Despite the wide variety of approaches to financing port facilities and services, however, there is a discernible current trend towards greater private sector participation in port activities, particularly those of a predominantly commercial nature such as cargo handling (EC, 1997). Ports are rapidly becoming a normal industry through the injection of private money that ensures greater competition, higher productivity and probably lower costs. In Europe, the UK is at the forefront of these developments. Recently, mainland Europe is catching up as governments loosen their grip on ports and container terminals. Ports are becoming landlords and lease container facilities to private companies. Even port authorities are linking up and more consolidation is to follow with the UK and Germany leading the way. So far, the benefits of private involvement in ports are strictly limited to container terminals. Until very recently, political interference and the structure of port management had not changed to meet the new circumstances. EU research has shown that financing of ports and maritime infrastructure in Europe and policies on charging their users vary considerably, reflecting the differences in the way in which their ownership and organisation has been approached (EC, 1997). EU policy aims at transparency in financing and charging (fair and efficient) of port users without distorting competition, but such policies are bound to have a limited impact as the Commission cannot control public financing of infrastructure.

Figure 2 depicts the actors and their relations with respect to investment in container terminals, in general. In Northern European landlord ports, the most common financial structure is one in which the government pays for access to the port by land and sea, an (autonomous) port authority funds infrastructure such as land reclamation and quay walls, and private container terminal operators fund the suprastructure: paving, buildings and mechanical equipment. Infrastructure costs are recovered to a greater or lesser extent through charges on ships and cargo, and rental and leasing payments from the container-handling companies. However, there remain large differences in the level of public sector financial support, which are passed on into port tariffs (Farrell, 1999). In Southern Europe, port authorities and/or the state were until recently responsible for almost all port investment, including mechanical equipment and superstructure as well as infrastructure. This was the result of vertical integration (Greece), strength of unions (Italy), the weak financial position of the private stevedores (Spain) or the treatment of ports as public service organisations (France). However, the reforms of the early 1990s and the move towards landlord ports have resulted in a gradual convergence of financial structures in Northern and Southern Europe.

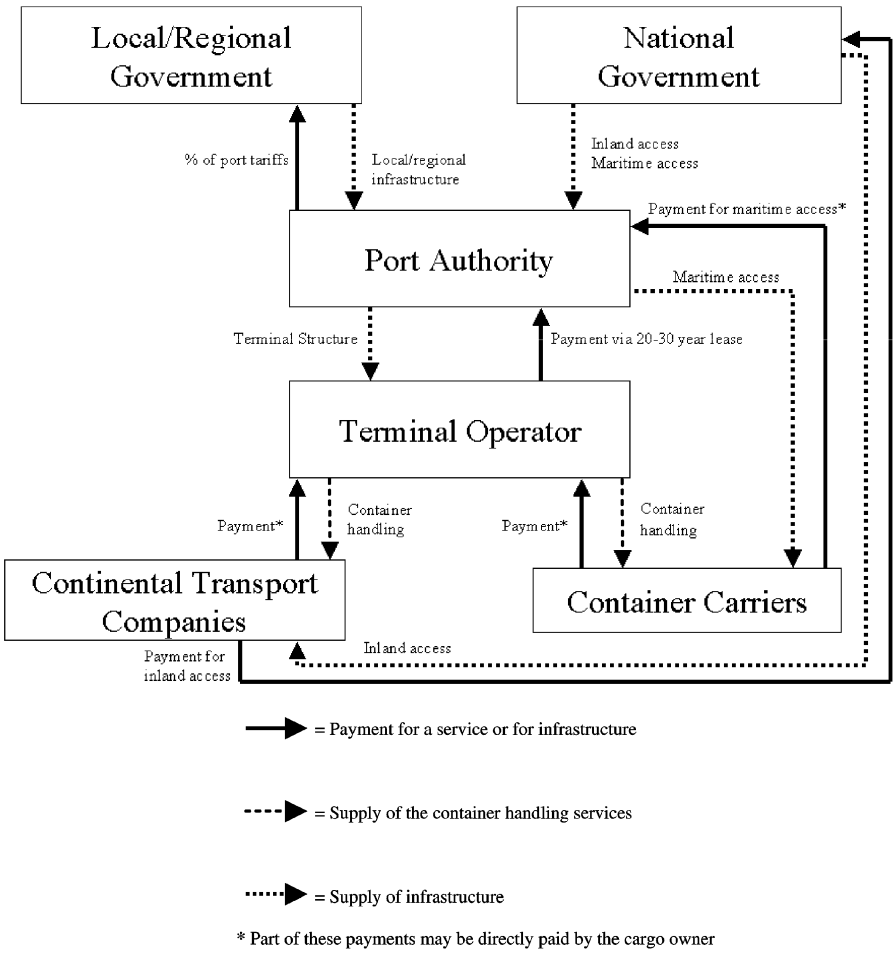

Figure 2: An overview of central actors and relations in container terminal investment
Source: based on Wiegmans *et al.* (1998)

It appears that private involvement in financing container terminals in ports is high compared to other investments in transport infrastructure such as roads and railways. A possible explanation for the 'demand' of private investments by the government is that container terminal operations are too complex for cities and regions; another explanation of private involvement may be found in the increasing efficiency of privately run terminals. A third reason may have to do with the increasing scale of container terminals and, finally, a part of the picture may be provided by the fact that operating container terminals is no longer

considered as a core business of governments. Reasons for governments to be still involved in container terminal development are to be found in the creation of employment and also the fact that ensuring sufficient provision of infrastructure is sometimes still considered as government core business. However, the main reason may be port competition. Almost all container terminals in Europe are subsidised which means that a new terminal will almost certainly have to be subsidised too, if it is to compete with existing terminals.

Container terminal infrastructure investments

Container terminals form a central part of the transport infrastructure for freight transport. A terminal is a place where containers are transferred among transport modes and is thus located at modal transfer points such as ports (see also Wiegmans *et al.*, 1999). In the terminal market, there are two important groups striving for quality: owners and operators:

1. Terminal *owners not* providing services themselves (investors). Basically, there are three forms of terminal ownership: private, public, or a public/private partnership. It is especially the latter form of ownership that can further complicate daily operations, due to actors often having conflicting interests; and
2. Terminal *operators* who provide the terminal service assortment. Terminal operations can be carried out by a wide variety of economic agents such as an independent terminal operator, railway company, seaport company, shipping line, multimodal transport company/forwarder, the road haulage industry, and/or even a city. Also, a consortium of more than one economic agents may be formed to run a terminal.

Table 1 distinguishes various alternatives of marine container terminal development. A container terminal can basically be developed in three ways: a new container terminal can be developed on a greenfield site, an existing container terminal can be extended, and an industrial site can be redeveloped into a container terminal. Four main categories of terminal investments can be envisaged (see Table 1):

1. *Infrastructure* investments consist of investments in rail, road, barge and sea facilities to the terminal (terminal external);
2. Terminal *superstructure* investments consist of specific investments (eg quays and crane rails) in terminal infrastructure (terminal internal);
3. Investments in the terminal *suprastructure* are investments on the terminal site that are not specific for a container terminal (eg terminal buildings, pavements, lighting, etc.); and

Table 1: Container terminal development and investment categories

	New CT	Extension of CT	Redevelopment
Infrastructure	X	X	x
Terminal superstructure	X	X	X
Suprastructure	X	X	X
IT structure	X	X	x

X=high importance in financial terms, x=average importance in financial terms.
Source: Wiegmans *et al.* (1999)

4. *IT structure* investments are all information technology investments needed for the container terminal.

Especially the information technology is seen as the battleground of this decade among not just carriers, but also forwarders, logistics based integrators, pure technology companies, and maybe terminal operators (Peters, 2001).

Investments in container terminals: characteristics and risks

According to Farrell (1999) there are several reasons why ports have been more successful than other modes of transport in attracting private capital. This holds true especially for investments in container terminals.

- In most European countries, substantial public resources have gone into port infrastructure development, allowing service providers to make healthy profits at prices that are perceived as reasonable by their customers. The assignment of infrastructure to terminal operators in large blocks – which is quite unlike the 'open access' stevedoring arrangements found in some other parts of the world – has restricted competition from new entrants and protected monopoly profits (an opposite position is faced by the railways). Overall, in most container ports, there is only one container terminal operator, which suggests the existence of regional monopolies.
- The second reason for private sector interest in container terminals is the labour productivity gains in recent years, and the steady fall in unit costs due to economies of scale, which have not always been passed on to container terminal (port) users through lower tariffs. Private operators taking over the management of a public facility have usually been able to improve on past profit levels through the introduction of more flexible labour practices. The limited supply of terminals suitable for leasing and the high costs of building new infrastructure allow these profit levels to be maintained.
- Furthermore, most container terminals involve relatively low risks after government intervention. The amounts of private investment required are still relatively small in comparison with other transport modes. Most of the

assets are mobile, with well-developed second hand markets. Private investment in container terminals is therefore not such a leap in the dark as it is in other transport modes.

The main issues in involving private finance for transport infrastructure investments in Europe – through long leasing contracts and operational involvement – concern risk sharing, higher efficiency, and infrastructure competition. The degree of risk sharing depends on the lease contract, but some general statements on the various risk components can be made.

In general, the government 'controls' the political risk of all characteristics of the investment in a container terminal. The terminal operator is 'safeguarded' from this risk by the government. The financial risks are shared between the government and the private terminal operator through lease agreements. The governmental body mainly carries the construction risks of the container terminal. The private terminal operator runs both the operational risk and the commercial risk. Besides reducing the risks mentioned above for private container terminal operators, there are beneficial aspects for both parties that might explain the higher level of occurrence of public-private cooperation in ports:

- With the construction of a new container terminal a city expects to receive more seaport tariffs and an increase in employment. These (financial) benefits are *extra benefits* above the amount resulting from the lease of the terminal facilities;
- In general, a container terminal has to compete with container terminals in other harbours for trans-shipment volume (*inter-port competition*). This leads to a convergence of interest between the private container terminal operators and their respective port authorities, united by their efforts to compete against other container ports. In the case of road and rail investment, such an identification of public (regional) interest and private interest is less probable.

THE RELATION BETWEEN RISKS, PROFITS, AND PUBLIC PRIVATE PARTNERSHIPS

European container terminals are normally operated on a common-user basis, and have different characteristics (Farrell, 1999). They have been transferred to the private sector as leasehold concessions rather than privately built installations. Their main customers are shipping lines rather than tramps, making them more responsive to quality of service than to price. Since container lines have a greater choice of ports than bulk shippers and are more mobile, one often observes fierce inter-port competition.

Lately, we have seen the development of the first dedicated container terminals in Europe (eg P&O in Antwerp and Euromax in Rotterdam). Due to the increasing scale of container carriers and the continuing development of liner shipping alliances, volume seems sufficient to justify dedicated terminals providing just the services as they are needed (see also Benacchio *et al.*, 2000). The problem remains though that public ports bear the risks of new investment, and these risks are often underestimated by public port officials. As a result, ports may fail to choose the best investment or the best development strategy (Luberoff and Walder, 2000). This can be countered through true project-based financing (shifts risk from public to private parties and improves decision making on investments in intermodal facilities). Also the new proposed regulation by the EU suggests a changing attitude in Europe towards ports (Commission of the European Communities, 2001). The trend towards more private involvement is acknowledged and will be facilitated in the near future.

Figure 3 presents a short-term investment situation where, under certain assumptions, it is profitable for a private company to invest in a terminal on the basis of a public-private partnership. As a consequence, investment costs are reduced (for the private party) through suitable lease contracts. This results in a lower average total cost curve, which is now below the average revenue curve. Marginal costs are not considered constant anymore. Price will be set at p_1 and the

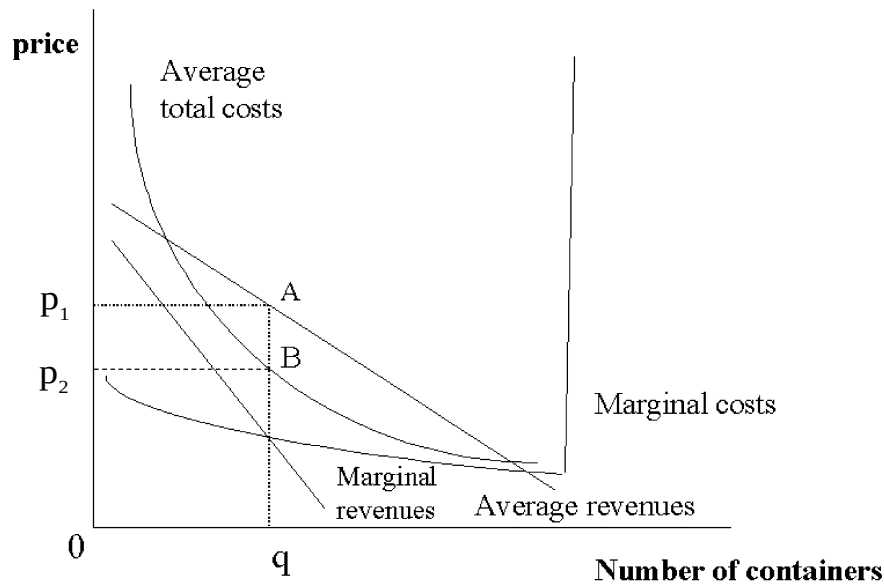

Figure 3: Market situation for an investor in terminals
Source: Nijkamp and Rienstra (1995), adapted

terminal operator will make a profit of p_1p_2BA (assuming, for the sake of simplicity, that no price discrimination takes place). In practice, however, prices are subject to competitive pressures by container carriers and will thus be, in general, lower than p_1 (the demand function is not changed).

Some remarks are in order concerning this analysis. The marginal cost curve becomes almost vertical when terminal capacity is not sufficient anymore to handle all containers. More containers can be handled only when capacity is expanded and all other measures to increase terminal productivity have been taken (eg longer port and terminal operating hours, more cranes, higher employment, etc.). Furthermore, pricing will be affected by strategies of other competing ports. However, as mentioned above, there has been a convergence of interest between the private operators and their port authorities, united in their effort to compete against other ports (Farrell, 1999). The economies of scale available to established operators puts them in a strong competitive position.

From the above it becomes clear that although terminal operations can be profitable business for private investors, the role of port authorities in this should not be underestimated. Differences in financial performance are not simply a question of some operators in Europe being more efficient than others, but are strongly influenced by government policy towards container terminal investment funding.

Current practice in terminal investments in Europe

Tables 2 and 3 present a number of cases in the Netherlands, extended with some information on container terminals in other European countries, in order to analyse Public Private Partnerships in practice. This overview gives some insight into the level of financial involvement of governmental bodies regarding container terminal investments. It seems that more public involvement leads to improved financial performance of the operator. In this context, it is important that a terminal is supposed to be efficient if it produces maximum output (container traffic in TEU) for given inputs (Notteboom *et al.*, 2000). This means that next to the investment picture also the operational performance is important. The tables are restricted to the main core variables of investments in container terminals.

We observe that the total investment amount varies between 860 million and 4.6 million Euros. Terminal capacities are varying between 15,000 and 3,500,000 TEU a year, in these cases. Almost all terminals are either barge oriented or deep-sea oriented. Initial investment costs vary between 135 – 465 Euros per TEU.

As can be seen in Table 3, the Public-Private ratio varies between 23 – 77 for the container terminal in Beverwijk and 75 – 25 for the Ceres Paragon Marine Terminal in Amsterdam. Almost all container terminals are Public Private Partnerships where the government contributes considerable amounts to their financing. Governmental involvement is rather high and several initiatives suggest that this is growing. Authorities want to be involved, because they believe

Table 2: Planned container terminal investment in Europe (1999 – 2001)

Terminal Name	Location	Investment (€)	Capacity (TEU/year)	Main customers	Transport mode	Investment per TEU (€)
Ceres Paragon Marine Terminal (NT)	Amsterdam	172 mln	950,000	–	Deepsea	180
Oosterhout (NT)	Oosterhout	–	025,000	Ikea	Barge	–
Alphen aan de Rijn (NT)	Alphen	22.5 mln	–	Heineken	Barge	–
IMCA (R)	Amsterdam	22.5 mln	150,000	–	Deepsea	150
WCT (NT)	Vlissingen	550 mln	2,500,000	–	Deepsea	220
Valburg (NT)	Nijmegen	550 mln	1,400,000	–	Barge/rail	415
Zeeland Container Terminal (NT)	Terneuzen	31 mln	100,000	Dow	Deepsea	310
Beverwijk (NT)	Beverwijk	6 mln	40,000	Corus, Cargill	Barge	150
Container Terminal regio Twente (NT)	Hengelo	4.6 mln	22,500	Grolsch Vredestein	Barge	205
Wanssum (NT)	Wanssum	10 mln	–	–	Barge	–
Container terminal Zutphen (NT)	Zutphen	7 mln	15,000	Addink/Opijnen	Barge	465
Moerdijk Container Terminal (E)	Moerdijk	20 mln	150,000	–	Deepsea	135
Euromax Container Terminal (NT)	Rotterdam	525 mln	1,700,000	P&O Nedlloyd	Deepsea	310
Shell Haven (R)	London	835 mln	300,000	–	Deepsea	240
Trinity Container Terminal (E)	Felixstowe	114 mln	500,000	–	Deepsea	230
Container Terminal Deurne (NT)	Deurne	4.9 mln	–	Gosselin Moving	Barge	–
CTIV (NT)	Bremen	260 mln	–	–	Deepsea	–
Containerterminal Duinkerken (E)	Duinkerken	15 mln	–	–	Deepsea	–
Harwich Container Terminal (E)	Harwich	160 mln	1,700,000	–	Deepsea	95
Southampton CT (NT)	Southampton	860 mln	–	–	Deepsea	–
River Terminal Wielsbeke (NT)	Wielsbeke	5 mln	75,000	–	Barge	70
Average	**–**	**208 mln**	**912,000**	**–**	**–**	**225**

Container terminal development plan: NT=New Terminal, E=Extension, R=Redevelopment.
Sources: Journal of Commerce, Cargoweb Newsletter, Annual Report of ECT and HHLG, and Nieuwsblad Transport, 1999 and 2000 (figures in million Euros)

that economic benefits are connected to this activity (terminal operation and investment).

Three terminal case studies and Public Private Partnership

Three cases were selected in order to look in more detail into investment components and the differences among the development of a new container terminal (Ceres, Amsterdam), the redevelopment of an existing site (Shell Haven, London), and the extension of an existing container terminal (Port of Felixstowe, Felixstowe).

Table 3: Terminal investments in Europe and public-private partnerships (1999 – 2001)

Terminal Name	Investment amount (€)	Public Investment	Private Investment	Capacity (TEU)	Public-Private Partnership ratio (%)
Ceres Paragon Marine Terminal	172 mln	128.5 mln	43.5 mln	950,000	75 – 25
Oosterhout	–	–	–	25,000	–
Alphen aan de Rijn	22.5 mln	–	–	–	–
IMCA	22.5 mln	–	–	150,000	–
WCT	550 mln	–	–	2,500,000	–
Valburg	550 mln	–	–	1,400,000	–
Zeeland Container Terminal	31 mln	17 mln	14 mln	75,000	55 – 45
Beverwijk	6 mln	1.4 mln	4.6 mln	–	23 – 77
Container Terminal regio Twente	4.6 mln	2.8 mln	1.8 mln	22,500	60 – 40
Wanssum	10 mln	–	–	–	–
Container terminal Zutphen	7 mln	–	–	15,000	–
Moerdijk Container Terminal	20 mln	–	–	150,000	–
Euromax Container Terminal	525 mln	300 mln	225 mln	1,700,000	57 – 43
Shell Haven	835 mln	–	–	3,000,000	–
Trinity Container Terminal	114 mln	–	–	500,000	–
Container Terminal Deurne	4.9 mln	–	–	–	–
CTIV	260 mln	–	–	–	–
Containerterminal Duinkerken	15 mln	9 mln	6 mln	–	60 – 40
River Terminal Wielsbeke (NT)	5 mln	2.4 mln	2.6 mln	75,000	48 – 52
Harwich Container Terminal	–	–	–	1,700,000	–
Southampton CT	860 mln	–	–	–	–
Average	**208 mln**	**66 mln**	**43 mln**	**912,000**	**55 – 45**

NT=New Terminal, E=Extension, R=Redevelopment.
Sources: Journal of Commerce, Cargoweb Newsletter, Annual Reports ECT and HHLG, and Nieuwsblad Transport (1999 and 2000)

Ceres Paragon Marine Terminal Amsterdam

The terminal in Amsterdam is a joint project of Ceres Terminals Inc and the Port Management of Amsterdam. Total investment is estimated at 172 million Euros and the terminal was fully operational in July 2001. Total extra employment is estimated at 600 persons. Ceres Terminals Inc has invested 43.5 million Euros (terminal buildings) and the Amsterdam Port Authority another 128.5 million Euros in infrastructure and part of the cranes (Ceres, 1998). A contract for all construction activities (such as berth dock, quay walls, paving, lightning, fencing, drainage, electrical systems, and other subsoil infrastructure; rail terminal and crane rails) was awarded for 41 million Euros.

Port of Felixstowe (United Kingdom)

The container terminal in Felixstowe is a joint project of Hutchison Whampoa and the Port Management of Felixstowe. The current terminal consists of 540 acres and an additional 250 acres, for which a long term lease has been granted. The expansion plan has a two year time path and will add about 500,000 TEU in

extra container handling capacity. Total investment is estimated at 114 million Euros. The expansion plan includes a quay extension of 270 metres and an additional 25 acres. The extra quay will be capable of serving two extra container ships. The three extra cranes are capable of serving ships up to 20 containers – and maybe even 22 – wide on deck. Cargo handling equipment is included in the investment amount. The current terminal is studying the possibility of adding cargo handling equipment worth 34 million Euros as well. This amount will probably be paid for two quay cranes and 10 rubber-tyre gantry cranes. The 26 km long approach channel has just been dredged to a depth of 15 metres (high tide). Dredging costs were in the order of 46 million Euros.

P&O Shell Haven Container Terminal (Thurrock, Essex)
P&O and Shell will redevelop this former refinery site into a container port of 3.5 million TEUs when fully developed. The site will consist of 1,500 acres of land, 3,000 m of quays providing berths for up to 10 vessels. The surrounding area will be developed to provide services such as transport and logistics. P&O will purchase the land required and the site will be jointly developed with Shell. The Port of London Authority and Thurrock Council form part of the proposed deal to develop the site. Currently, the site is well connected by road and rail to the UK national network, but the capacity of these connections is planned to increase further. Total investment is thought to exceed 835 million Euros over the next 10 – 15 years. The terminal will be built in stages and the first phase – ready in 2003 or 2004 – will cost around 167 million Euros.

Taking a closer look at the different container terminal development models, one comes to Table 4. The table shows the relation between container terminal development types and risks of investments in infrastructure.

In all three cases, one observes that the private terminal operator runs the commercial and the operational risk. Financial and construction risks are shared in all three cases. In the case of a completely new terminal, one can see that the government runs most of the political risk, whereas in the case of an extension of a container terminal (eg Felixstowe) the political risk is shared. In the case of the

Table 4: Container terminal types and characteristics of investments in infrastructure

	Amsterdam	Felixstowe	Thurrock, Essex
Political risk	G	G/P	None
Financial risk	G/P	G/P	G/P
Construction risk	G/P	G/P	G/P
Operational risk	P	P	P
Commercial risk	P	P	P

G=government, P=private party; in this case the terminal operator.
Source: Wiegmans *et al.* (1999)

redevelopment of an existing site (a former oil refinery in the case of London), the political risk is of far less importance, since all parties are eager to transform such a site into a more productive area.

CONCLUSION

The institutional arrangements of financing ports and maritime infrastructure in Europe vary considerably, reflecting the considerable differences in their ownership and organisational structures. The management of ports often depends on public authorities and is subject to different degrees of regulation. Port infrastructure has long been regarded as a pure public good regulated and financed by the government. But it appears that there is recently a distinct trend towards greater private participation in port activities. Financing of particular port facilities (particularly those with a predominantly commercial nature) is increasingly becoming the responsibility of the private sector, while the government (or public port authority) tends to restrict itself more and more to its landlord role.

However, fully privatised port activities are rarely identified, as it is still not attractive to private investors to invest in terminal infrastructure without government involvement. This is mainly due to some specific risks caused by several characteristics (public good) of transport infrastructure. In analysing investment projects of container terminals, in Europe in particular, we found that in all projects both the government and private parties play a role. In general, container terminals are an example of a successful cooperation between government and business.

So, it seems beneficiary for both parties to be involved in financing port infrastructure. Possible explanations for the involvement of governments include the creation of regional or national employment and the fact that infrastructure is still considered as being government core business. However, the main reason appears to be competition with other ports. Most ports are still receiving large amounts of public funding, making it very difficult for other ports to be competitive without governmental support. Nevertheless, it is important to note that ports have been more successful than other modes of transport in attracting private capital. Reasons for this include the distinction between infrastructure and services (making operation of terminals profitable), labour productivity gains in recent years and the steady fall in unit costs, the relatively low risks due to the willingness of governments to bear political, financial and construction risks and the light regulatory framework. It can be concluded from this that the high private involvement in port infrastructure investment is mainly due to support by public bodies making risks acceptable.

Although it is generally questionable whether infrastructure can be entirely subject to market forces, for particular facilities there is certainly a clear scope, and ports offer a good example; they are rapidly becoming a normal market-based industry through the injection of private money that ensures greater competition, higher productivity and probably lower costs. Container terminals in particular represent more and more normal business. The chance for normal profits seems to be higher in investments in container terminals than in conventional investments in infrastructure. A fully competitive market for terminals is in the long-run not unrealistic. An obstacle to this trend is posed by the main reason of governmental involvement: As long as some governments subsidise port activities, there is a case of unfair competition; then, it is difficult for others to follow a different policy of reducing subsidies. In order to deal with this effectively, it is plausible that coordination on a European level may be necessary. As current EU policy is aimed at fair competition without distorting market regulation, it is likely to expect that the EU will discourage financial involvement of (local) public authorities in the port sector. This means that, despite the risks, existing terminal subsidies will be reduced and new container terminals will be built to the maximum extent possible without taxpayer's money.

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